Dean, Ouisha <ouisha.dean@solvay.com>

GND, GNS-1, GNS-2, FRP lb/hr. emission calcs.

3 messages

Toenyes, Ouisha <ouisha.toenyes@solvay.com> Tue, Mar 20, 2012 at 5:00 PM
To: tmartin@airsci.com
Cc: Tim Brown <Tim.Brown@solvay.com>

Hi Tim,

As discussed per our phone conversation, here are the original permit application forms for sources GND, GNS-1, GNS-2, and FRP. If you have any questions or comments please let me know.
Thanks for you help,
Ouisha Toenyes
Environmental Engineer
(307) 872 - 6571
ouisha.toenyes@solvay.com

3 attachments

IGNDSE30.DOC
41K

IGNSSE30.DOC
41K

IFRPSE30.DOC
56K

Tim Martin <tmartin@airsci.com> Tue, Mar 20, 2012 at 6:22 PM
To: "Toenyes, Ouisha" <ouisha.toenyes@solvay.com>
Cc: Tim Brown <Tim.Brown@solvay.com>, Rodger Steen <rgsteen@airsci.com>

Ouisha,

As we discussed, the GNS, GND, and FRP sources are old diesel engine sources operated on an emergency basis (i.e., 500 hr/yr), but may need to be included in the current modeling effort. There are some existing Solvay permit forms related to these sources, but Solvay is not aware of any permits for the sources. I see only hr/yr and opacity limits in the Title V for these sources and no emissions limits. So, it appears that we will need to rely existing permit forms for Solvay as the starting point here.

I have attached a rough spreadsheet showing the values from the Solvay permit forms for GND, GNS-1, GNS-2, and FRP and my calculations checking these values. In all cases, the tpy values are calculated based on 500 hour/yr operations and I can match the calculations on the forms.

The calculations for the GNS sources are performed in a similar manner in the permit forms, but these GNS sources are engines > 600 hp. The AP-42 emission factors for engines > 600 hp are provided in AP-42 Tables 3.4-1 and 3.4-2 and are different than those used for < 600 hp engines which were used on the Solvay forms. It appears that the emission factors for the smaller engines (< 600 hp) were incorrectly used here for the 1400+ hp GNS engines. I believe that the GNS calculations should be corrected using the appropriate EFs from AP-42 section 3.4 (large engines) – and have provided what I believe to be the correct calculations (in yellow and orange). Please take a look and we can discuss.

-Tim

From: Toenyes, Ouisha [mailto:ouisha.toenyes@solvay.com]
Sent: Tuesday, March 20, 2012 4:00 PM
To: tmartin@airsci.com
Cc: Tim Brown
Subject: GND, GNS-1, GNS-2, FRP lb/hr. emission calcs.

[Quoted text hidden]

--

--

check_gns-frp sources_03202012.xlsx
15K

Tim Martin <tmartin@airsci.com> Tue, Mar 20, 2012 at 6:38 PM
To: "Toenyes, Ouisha" <ouisha.toenyes@solvay.com>
Cc: Tim Brown <Tim.Brown@solvay.com>, Rodger Steen <rgsteen@airsci.com>, tmartin@airsci.com

Ouisha,

In the previous e-mail, I didn't point out that the small engine (< 600 hp) emission factors that were used for the large GNS 1 and 2 engines are all more conservative (i.e., higher) than then large engine (> 600 hp) emission factors from AP-42. This may have been intentional, but I don't know. Worst-case we are conservative if we use the emissions provided on the permit forms.

-Tim

From: Tim Martin [mailto:tmartin@airsci.com]
Sent: Tuesday, March 20, 2012 5:23 PM
To: 'Toenyes, Ouisha'
Cc: 'Tim Brown'; Rodger Steen (rgsteen@airsci.com)
Subject: RE: GND, GNS-1, GNS-2, FRP lb/hr. emission calcs.

Ouisha,

As we discussed, the GNS, GND, and FRP sources are old diesel engine sources operated on an emergency basis (i.e., 500 hr/yr), but may need to be included in the current modeling effort. There are some existing Solvay permit forms related to these sources, but Solvay is not aware of any permits for the sources. I see only hr/yr and opacity limits in the Title V for these sources and no emissions limits. So, it appears that we will need to rely existing permit forms for Solvay as the starting point here.

I have attached a rough spreadsheet showing the values from the Solvay permit forms for GND, GNS-1, GNS-2, and FRP and my calculations checking these values. In all cases, the tpy values are calculated based on 500 hour/yr operations and I can match the calculations on the forms.

The calculations for the GNS sources are performed in a similar manner in the permit forms, but these GNS sources are engines > 600 hp. The AP-42 emission factors for engines > 600 hp are provided in AP-42 Tables 3.4-1 and 3.4-2 and are different than those used for < 600 hp engines which were used on the Solvay forms. It appears that the emission factors for the smaller engines (< 600 hp) were incorrectly used here for the 1400+ hp GNS engines. I believe that the GNS calculations should be corrected using the appropriate EFs from AP-42 section 3.4 (large engines) – and have provided what I believe to be the correct calculations (in yellow and orange). Please take a look and we can discuss.

-Tim

From: Toenyes, Ouisha [mailto:ouisha.toenyes@solvay.com]
Sent: Tuesday, March 20, 2012 4:00 PM
To: tmartin@airsci.com
Cc: Tim Brown
Subject: GND, GNS-1, GNS-2, FRP lb/hr. emission calcs.

Hi Tim,

[Quoted text hidden]

--

--

Insignificant Source ID: GND

Section B: Source Information Section B Supplement Attached? Yes _____ No X

Complete one Section B form and Section B Supplement (if appropriate) for each point and area (or fugitive) source associated with the facility named in Section A of the Operating Permit Application Form. Indicate above for each Section B form completed whether a Section B Supplement is attached.

1. Source Identification Number: GND Source Description: Generator - (C/S Plant)
   EG-301

2. Source UTM Grid Coordinates:

		Northing		Easting
Zone: 12	Horizontal:	4,594,714	Vertical:	603,897

3. List all air pollution permits currently applicable to this source:

   N/A

4. List all *State Only* requirements currently applicable to this source:

   N/A

5. Operating Schedule: _____hours/day _____ days/week _____ weeks/year*
   * Assume a maximum of 500 hours/year.

   Is the operating schedule limited by a permit condition? Yes _____ No X

   If yes, provide the permit number: _____

6. Seasonal Variation (%): Jan-Mar 25 Apr-Jun 25 Jul-Sep 25 Oct-Dec 25

7. a. Materials used in unit (include solid fuels):

Type of Material	Process Weight Average (lb/hr)	Process Weight Maximum (lb/hr)	Maximum Quantity/Year
Diesel Fuel	8.0 gal/hr	8.0 gal/hr	4,000 gal/year

b. Products of unit:

Products	Maximum Quantity/Year
Electricity	

8. Design (Throughput/Firing Rate/Horsepower): 75 KW

   Site Rated Capacity (if applicable): N/A

9. Fuels Analysis (if applicable):

	Amount	Heat Content	Sulfur	Ash
Coal:	--- Ton/yr	--- Btu/lb	--- %	--- %
Fuel Oil:	4,000 Gal/yr	140,000 Btu/gal	0.05 %	--- %
Nat. Gas:	--- 10^6SCF	--- Btu/ft^3	--- %	--- %
Other:	--- (____)	--- (_____)	--- %	--- %

10. Stack Parameters (if applicable):

    Stack Height: 10' ft Stack Diameter: 0.17 ft

    Stack Temperature: 500 ^oF Stack Flow Rate: 100 (est) ACFM

11. Control Equipment (if applicable): None

Pollutant	Control Equipment Description	Efficiency

12. Emissions Data (attach calculations):

Air Pollutant	Potential to Emit (tons/year)	Applicable Emission Limit	Test Method
Particulate Matter	0.09	N/A	N/A
Sulfur Dioxide (SO_2)	0.08	N/A	N/A
Nitrogen Oxides (NO_X)	1.23	N/A	N/A
Carbon Monoxide (CO)	0.27	N/A	N/A
Volatile Organic Compounds (VOC)	0.12	N/A	N/A

* See Section 15.

13. Describe any limitations on operations or any work practice standard which affect emissions of any regulated pollutant: None

14. Source Compliance Certification: None

a. Compliance method type (check as applicable):

Emission standard _____ Monitoring _____ Other _____

If other, please describe: _____

b. Compliance Monitoring Devices: None

Air Pollutant	Compliance Monitoring Device	Brand & Model Number

c. Other Monitoring Information: None

Monitor location description: _____

Generally describe the frequency and duration of sampling and how the data will be reported:

_____

_____

_____

d. Recordkeeping: None

Data being recorded: _____

Frequency of recordkeeping: _____

e. Reporting: None

Generally describe what is reported: _____

Frequency of reporting: _____

Beginning date: _____

15. Enhanced Monitoring (*Applicability will be determined when the final rule is promulgated by EPA*): N/A

a. Is the source subject to enhanced monitoring as required by sections 114(a)(3) and 504(b) of the Act? Yes _____ No _____. If no, please continue with #14 below.

b. Describe the proposed enhanced monitoring protocol (EMP) for this source: _____

_____

_____

c. Describe the proposed test schedule for the EMP: _____

_____

_____

_____

16. Applicable Requirements:

a. Date of Construction or Last Modification of this source: 1/20/86

b. Cite the applicable requirement(s) for this source: N/A

c. Generally describe the applicable requirement(s): N/A

d. Applicable emission standard: N/A

17. Provide any other information necessary by any other applicable requirement (see instruction sheet):

Based on AP-42 emission factors:

Air Pollutant	AP-42 Factor (Lb/MMBtu)
Particulate Matter	0.31
Sulfur Dioxide (SO_2)	0.29
Nitrogen Oxides (NO_x)	4.41
Carbon Monoxide (CO)	0.95
VOC	0.43

Insignificant Source ID: GNS

Section B: Source Information Section B Supplement Attached? Yes _____ No X

Complete one Section B form and Section B Supplement (if appropriate) for each point and area (or fugitive) source associated with the facility named in Section A of the Operating Permit Application Form. Indicate above for each Section B form completed whether a Section B Supplement is attached.

1. Source Identification Number: GNS Source Description: Steam Plant Generators (2)
   EG-1 & 2

2. Source UTM Grid Coordinates: Center of Plant

		Northing		Easting
Zone: 12	Horizontal:	4,594,769	Vertical:	603,786

3. List all air pollution permits currently applicable to this source:

   N/A

4. List all *State Only* requirements currently applicable to this source:

   N/A

5. Operating Schedule: _____hours/day _____ days/week _____ weeks/year*
   * Assume a maximum of 500 hours/year.

   Is the operating schedule limited by a permit condition? Yes _____ No X

   If yes, provide the permit number: _____

6. Seasonal Variation (%): Jan-Mar 25 Apr-Jun 25 Jul-Sep 25 Oct-Dec 25

7. a. Materials used in unit (include solid fuels):

Type of Material	Process Weight Average (lb/hr)	Process Weight Maximum (lb/hr)	Maximum Quantity/Year
Diesel Fuel	168 gal/hr	168 gal/hr	84,000 gal/yr

b. Products of unit: N/A

Products	Maximum Quantity/Year

8. Design (Throughput/Firing Rate/Horsepower): 1100 KW each

   Site Rated Capacity (if applicable): N/A

9. Fuels Analysis (if applicable):

	Amount	Heat Content	Sulfur	Ash
Coal:	--- Ton/yr	--- Btu/lb	--- %	--- %
Fuel Oil:	84,000 Gal/yr	140,000 Btu/gal	0.05 %	--- %
Nat. Gas:	--- 10^6SCF	--- Btu/ft^3	--- %	--- %
Other:	--- (____)	--- (_____)	--- %	--- %

10. Stack Parameters (if applicable):

    Stack Height: 15' ft Stack Diameter: 0.33 ft

    Stack Temperature: 745 ^oF Stack Flow Rate: 11,400 ACFM

11. Control Equipment (if applicable): None

Pollutant	Control Equipment Description	Efficiency

12. Emissions Data (attach calculations):

Air Pollutant	Potential to Emit (tons/year)	Applicable Emission Limit	Test Method
Particulate Matter	1.82	N/A	N/A
Sulfur Dioxide (SO_2)	1.71	N/A	N/A
Nitrogen Oxides (NO_X)	25.93	N/A	N/A
Carbon Monoxide (CO)	5.59	N/A	N/A
Volatile Organic Compounds (VOC)	2.53	N/A	N/A

* See Section 15.

13. Describe any limitations on operations or any work practice standard which affect emissions of any regulated pollutant: None

14. Source Compliance Certification: None

a. Compliance method type (check as applicable):

Emission standard _____ Monitoring _____ Other _____

If other, please describe: _____

b. Compliance Monitoring Devices: None

Air Pollutant	Compliance Monitoring Device	Brand & Model Number

c. Other Monitoring Information: None

Monitor location description: _____

Generally describe the frequency and duration of sampling and how the data will be reported:

_____

_____

_____

d. Recordkeeping: None

Data being recorded: _____

Frequency of recordkeeping: _____

e. Reporting: None

Generally describe what is reported: _____

Frequency of reporting: _____

Beginning date: _____

15. Enhanced Monitoring (*Applicability will be determined when the final rule is promulgated by EPA*): N/A

a. Is the source subject to enhanced monitoring as required by sections 114(a)(3) and 504(b) of the Act? Yes _____ No _____. If no, please continue with #14 below.

b. Describe the proposed enhanced monitoring protocol (EMP) for this source: _____

_____

_____

c. Describe the proposed test schedule for the EMP: _____

_____

_____

_____

16. Applicable Requirements:

a. Date of Construction or Last Modification of this source: 1/20/86

b. Cite the applicable requirement(s) for this source: N/A

c. Generally describe the applicable requirement(s): N/A

d. Applicable emission standard: N/A

17. Provide any other information necessary by any other applicable requirement (see instruction sheet):

Based on AP-42 emission factors:

Air Pollutant	AP-42 Factor (Lb/MMBtu)
Particulate Matter	0.31
Sulfur Dioxide (SO_2)	0.29
Nitrogen Oxides (NO_x)	4.41
Carbon Monoxide (CO)	0.95
VOC	0.43

Insignificant Source ID: FRP

Section B: Source Information Section B Supplement Attached? Yes _____ No X

Complete one Section B form and Section B Supplement (if appropriate) for each point and area (or fugitive) source associated with the facility named in Section A of the Operating Permit Application Form. Indicate above for each Section B form completed whether a Section B Supplement is attached.

1. Source Identification Number: FRP Source Description: Emergency Fire Pump
   PU-76

2. Source UTM Grid Coordinates:

	Northing	Easting
Zone: 12 Horizontal:	4,594,711	Vertical: 603,797

3. List all air pollution permits currently applicable to this source:

   N/A

4. List all *State Only* requirements currently applicable to this source:

   N/A

5. Operating Schedule: _____hours/day _____ days/week _____ weeks/year*
   * Assume a maximum of 500 hours/year.

   Is the operating schedule limited by a permit condition? Yes _____ No X

   If yes, provide the permit number: _____

6. Seasonal Variation (%): Jan-Mar 25 Apr-Jun 25 Jul-Sep 25 Oct-Dec 25

7. a. Materials used in unit (include solid fuels):

Type of Material	Process Weight Average (lb/hr)	Process Weight Maximum (lb/hr)	Maximum Quantity/Year
Diesel Fuel	14.5 gal/hr	14.5 gal/hr	7,250 gal/yr

b. Products of unit:

Products	Maximum Quantity/Year
High pressure water	

8. Design (Throughput/Firing Rate/Horsepower): 258 Bhp/hr

Site Rated Capacity (if applicable): N/A

9. Fuels Analysis (if applicable):

	Amount	Heat Content	Sulfur	Ash
Coal:	--- Ton/yr	--- Btu/lb	--- %	--- %
Fuel Oil:	7,250 Gal/yr	140,000 Btu/gal	0.05 %	--- %
Nat. Gas:	--- 10^6SCF	--- Btu/ft^3	--- %	--- %
Other:	--- (____)	--- (_____)	--- %	--- %

10. Stack Parameters (if applicable):

Stack Height: 10' ft Stack Diameter: 0.25 ft

Stack Temperature: 500 ^oF Stack Flow Rate: 225 (est) ACFM

11. Control Equipment (if applicable): None

Pollutant	Control Equipment Description	Efficiency

12. Emissions Data (attach calculations):

Air Pollutant	Potential to Emit (tons/year)	Applicable Emission Limit	Test Method
Particulate Matter	0.16	N/A	N/A
Sulfur Dioxide (SO_2)	0.15	N/A	N/A
Nitrogen Oxides (NO_X)	2.24	N/A	N/A
Carbon Monoxide (CO)	0.48	N/A	N/A
Volatile Organic Compounds (VOC)	0.22	N/A	N/A

* See Section 15.

13. Describe any limitations on operations or any work practice standard which affect emissions of any regulated pollutant: None

14. Source Compliance Certification: None

a. Compliance method type (check as applicable):

Emission standard _____ Monitoring _____ Other _____

If other, please describe: _____

b. Compliance Monitoring Devices: None

Air Pollutant	Compliance Monitoring Device	Brand & Model Number

c. Other Monitoring Information: None

Monitor location description: _____

Generally describe the frequency and duration of sampling and how the data will be reported:

_____

_____

_____

d. Recordkeeping: None

Data being recorded: _____

Frequency of recordkeeping: _____

e. Reporting: None

Generally describe what is reported: _____

Frequency of reporting: _____

Beginning date: _____

15. Enhanced Monitoring (*Applicability will be determined when the final rule is promulgated by EPA*): N/A

a. Is the source subject to enhanced monitoring as required by sections 114(a)(3) and 504(b) of the Act? Yes _____ No _____. If no, please continue with #14 below.

b. Describe the proposed enhanced monitoring protocol (EMP) for this source: _____

_____

_____

c. Describe the proposed test schedule for the EMP: _____

_____

_____

_____

16. Applicable Requirements:

a. Date of Construction or Last Modification of this source: 1/20/86

b. Cite the applicable requirement(s) for this source: N/A

c. Generally describe the applicable requirement(s): N/A

d. Applicable emission standard: N/A

17. Provide any other information necessary by any other applicable requirement (see instruction sheet):

Based on AP-42 emission factors:

Air Pollutant	AP-42 Factor (Lb/MMBtu)
Particulate Matter	0.31
Sulfur Dioxide (SO_2)	0.29
Nitrogen Oxides (NO_x)	4.41
Carbon Monoxide (CO)	0.95
VOC	0.43

Review GND, GNS, FRP Emissions - Solvay
3/20/2012

from table AP-42, Table 3.3-1, engines < 600 hp

Given

Id	Source	Annual Ops. (hr/yr)	Diesel Fuel Rate (gal/hr)	Diesel Fuel Rate (gal/yr)	Engine Rating (kW)	Engine Rating (hp)	Diesel Heat Content Btu/gal	S Content	PTE PM (tpy)	PTE SO2 (tpy)	PTE NOx (tpy)	PTE CO (tpy)	PTE VOC (tpy)	AP-42 EF PM	AP-42 EF SO2	AP-42 EF NOx	AP-42 EF CO	AP-42 EF VOC (lb/MMBtu)	
GND	Generator - (C/S plant)	500	8	4000	75	100.6	140000	0.05%	0.09	0.08	1.23	0.27	0.12	0.31	0.29	4.41	0.95	0.43	<< VOC is TOC + aldehydes

AirSci Calculations

Id	Source	Annual Ops. (hr/yr)	Hourly Heat Rate (MMBtu/hr)	PTE PM (lb/hr)	PTE SO2 (lb/hr)	PTE NOx (lb/hr)	PTE CO (lb/hr)	PTE VOC (lb/hr)	PTE PM (tpy)	PTE SO2 (tpy)	PTE NOx (tpy)	PTE CO (tpy)	PTE VOC (tpy)	
GND	Generator - (C/S plant)	500	1.12	0.347	0.325	4.939	1.064	0.482	0.09	0.08	1.23	0.27	0.12	
									ok	ok	ok	ok	ok	check

from table AP-42, Table 3.3-1, engines < 600 hp

Given

Id	Source	Annual Ops. (hr/yr)	Diesel Fuel Rate (gal/hr)	Diesel Fuel Rate (gal/yr)	Engine Rating (kW)	Engine Rating (hp)	Diesel Heat Content Btu/gal	S Content	PTE PM (tpy)	PTE SO2 (tpy)	PTE NOx (tpy)	PTE CO (tpy)	PTE VOC (tpy)	AP-42 EF PM	AP-42 EF SO2	AP-42 EF NOx	AP-42 EF CO	AP-42 EF VOC (lb/MMBtu)	
GNS	Steam Plant Generators (2)	500	168	84000	1100	1475.1	140000	0.05%	1.82	1.71	25.93	5.59	2.53	0.31	0.29	4.41	0.95	0.43	<< VOC is TOC + aldehydes

these should be from AP-42, Tables 3.4-1 and 3.4-2; engines > 600 hp

AirSci Calculations

Id	Source	Annual Ops. (hr/yr)	Hourly Heat Rate (MMBtu/hr)	PTE PM (lb/hr)	PTE SO2 (lb/hr)	PTE NOx (lb/hr)	PTE CO (lb/hr)	PTE VOC (lb/hr)	PTE PM (tpy)	PTE SO2 (tpy)	PTE NOx (tpy)	PTE CO (tpy)	PTE VOC (tpy)	AP-42 EF PM	AP-42 EF SO2	AP-42 EF NOx	AP-42 EF CO	AP-42 EF VOC (lb/MMBtu)	
GNS	Steam Plant Generators (2)	500	23.52	2.4	0.01	75.3	20.0	2.1	0.59	0.003	18.82	5.00	0.53	0.1	0.001	3.2	0.85	0.09	<< VOC is TOC here
									check	check	check	check	check						

from table AP-42, Table 3.3-1, engines < 600 hp

Given

Id	Source	Annual Ops. (hr/yr)	Diesel Fuel Rate (gal/hr)	Diesel Fuel Rate (gal/yr)	Engine Rating (kW)	Engine Rating (hp)	Diesel Heat Content Btu/gal	S Content	PTE PM (tpy)	PTE SO2 (tpy)	PTE NOx (tpy)	PTE CO (tpy)	PTE VOC (tpy)	AP-42 EF PM	AP-42 EF SO2	AP-42 EF NOx	AP-42 EF CO	AP-42 EF VOC (lb/MMBtu)	
FRP	Emer. Fire Pump	500	14.5	7250	192.4	258.0	140000	0.05%	0.16	0.15	2.24	0.48	0.22	0.31	0.29	4.41	0.95	0.43	<< VOC is TOC + aldehydes

AirSci Calculations

Id	Source	Annual Ops. (hr/yr)	Hourly Heat Rate (MMBtu/hr)	PTE PM (lb/hr)	PTE SO2 (lb/hr)	PTE NOx (lb/hr)	PTE CO (lb/hr)	PTE VOC (lb/hr)	PTE PM (tpy)	PTE SO2 (tpy)	PTE NOx (tpy)	PTE CO (tpy)	PTE VOC (tpy)	AP-42 EF PM	AP-42 EF SO2	AP-42 EF NOx	AP-42 EF CO	AP-42 EF VOC (lb/MMBtu)	
FRP	Emer. Fire Pump	500	2.03	0.6	0.6	9.0	1.9	0.9	0.16	0.15	2.24	0.48	0.22	0.31	0.29	4.41	0.95	0.43	<< VOC is TOC + aldehydes
									ok	ok	ok	ok	ok						

1 kw = 1.341022 hp